Expense. The Materials Cost can be residually calculated by subtracting Labor Cost and Depreciation/Amortization from Total Operating Expense.

The AT&T-sponsored model deviates significantly from this approach and consequently errs in its assignment of cost. The AT&T model residually computes Materials Costs (AT&T spreadsheet TFPLEC.WK4, AO23-AO33) from Total Operating Expense (AT&T spreadsheet TFPLEC.WK4, V23-V33), but the measures of both Labor Cost and Depreciation/Amortization that it subtracts are erroneous.

Instead of subtracting the Labor Cost booked to Total Operating Expense, it subtracts Total Compensation (AT&T spreadsheet TFPLEC.WK4, Z23-Z33). Total Compensation includes the Labor Costs associated with the construction of new plant; therefore Total Compensation is larger than Labor Cost booked to Total Operating Expense. The stock of capital includes the contribution of construction labor to production; to also include construction Labor Costs in Labor Input results in its double counting.

The AT&T model also does not use Depreciation Expense booked to Total Operating Expense. Instead it calculates the change in the Total Depreciation Reserve from the previous year (AT&T spreadsheet TFPLEC.WK4, X22-X33). This represents a significant understatement of Depreciation Expense, which results in a significant overstatement of Materials cost. This understatement of Depreciation Expense arises because changes in Depreciation Reserve are driven by two factors: the Depreciation Reserve is

increased by the amount of Depreciation Expense booked to Total Operating Expense in that year and is decreased by the amount of Depreciation Reserve removed due to the retirement of assets during the year. Since retired assets are often fully depreciated, this second factor is sizable, and the change in the Depreciation Reserve is much smaller than the amount of Depreciation Expense.

A comparison of the Depreciation and Amortization expense contained in the TFPRP for the seven RBOCs with the change in the Depreciation Reserve found in the AT&T-sponsored model indicates the difference is substantial. Over the 1988-94 period, RBOC Depreciation and Amortization expense averaged almost $14 billion per year, while the change in the Depreciation Reserve averaged $5.4 billion per year, only 38 percent of Depreciation and Amortization expense. Thus, the magnitude of this AT&T error is very large.

Finally, the AT&T model incorrectly computes its "residual" Capital Cost (AT&T spreadsheet TFPLEC.WK4, AC23-AC33). The residual method calculates Capital Cost by subtracting AT&T's erroneous estimates of Labor and Materials Cost from Total Revenue. The use of Total Compensation in the calculations has offsetting effects on Labor and Materials costs, but the significant understatement of Depreciation Expense (which leads to an overstatement of Materials Cost) leads to an understatement of the Capital residual.

The mismeasurement of Labor and Capital Cost directly leads to mis-measurement of Labor and Capital prices. The mismeasurement of Materials

Cost directly leads to mismeasurement of Materials quantity. These specific errors result in equal errors in AT&T's estimates of productivity and input price growth, producing offsetting impacts on AT&T's measured X factor. The incorrect assignment of Total Cost in the AT&T-sponsored model results in a 0.2 percentage point per year understatement in both productivity growth and input price growth over the 1988-1994 period, and a 0.3 percentage point per year understatement in both productivity growth and input price growth over the most recent five-year period, 1989-1994. These errors are illustrative of the basic accounting errors in the AT&T model, rendering its results meaningless. Even though these errors in productivity and input price measurement offset in AT&T's measure of the X factor, the fact is AT&T has produced unreliable estimates of both LEC productivity and input price growth.

The AT&T Materials Price Index Does Not Reflect the Purchases Made by the Local Exchange Carriers

The AT&T model constructs an excessively complicated and fundamentally flawed price index for materials. This price index is based on the Bureau of Labor Statistics "use matrix" of commodity purchases, and Bureau of Labor Statistics industry deflators for those purchases. The AT&T model constructs the materials price index by weighting each BLS industry deflator by the purchases of that type made by the Communications industry. Importantly, the Communications industry is significantly larger that the LECs, because it

includes all interexchange carriers, other telecommunications companies, and Radio and Television broadcasting companies.

It is critical to examine the reported Communications industry purchases in the use matrix to determine whether they represent the purchasing patterns of the LECs. If the LEC purchasing patterns differ from the Communications industry, then the weights used in the AT&T model will be wrong, and the resulting price index will be inaccurate.

A review of the use matrix utilized by AT&T shows that in 1987, 41% of Communications industry purchases were from other Communications industry firms.[19] The estimated value of these purchases was $33 billion. The industry contributing the second largest amount to Communications industry purchases was the Motion Picture industry, accounting for 10%. No other industry accounted for more than 4% of total purchases. A close review of the Communications industry to Communications industry transactions reveals that over 80% of that intra-Communications total is Access purchases made by IXCs from LECs.[20] Thus, most intra-Communications industry purchases are actually made by AT&T and other interexchange carriers, and not the LECs. Also, the

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[19] 1987 represents the most recent comprehensive estimates performed by the Bureau of Economic Analysis. The more recent data, found in the AT&T spreadsheet TELIO.WK3, shows a similar pattern.

[20] Based on information supplied by Mr. David M. Huether of the U.S. Department of Commerce, Bureau of Economic Analysis, Industry Economics Division, access charges accounted for $27 billion of the $33 billion in 1987 Communications Industry to Communications Industry transactions.

LECs make an insignificant amount of purchases from the Motion Picture industry as Materials purchases, with most of these purchases presumably being made by the Television industry. To summarize, while the use matrix may reflect purchases made by the Communications industry as a whole, the use matrix purchases cannot be meaningfully used to represent the Materials purchases of the LECs.

Table I-7 of the ARMIS 43-02 report provides some limited information on the types of companies that provide services to the LECs. This ARMIS 43-02 information demonstrates the inappropriateness of the AT&T approach to estimating Materials input inflation. Given the diverse sectors of the economy from which LECs purchase Materials, Rents and Services, it is appropriate to use the Gross Domestic Product price index as a proxy. If a more detailed price index is desired, the index should be constructed on the basis of the purchases information in Table I-1 and supporting tables in the ARMIS 43-02 Report, not on the BLS Input/Output matrices for Communications industry data, which are not representative for the LECs.

The AT&T-sponsored Materials price index is found in the AT&T spreadsheet TFPLEC.WK4, cells Y23-Y33, with the AT&T spreadsheet TELIO.WK3 being the source of the index. However, it is not clear where the index found in TFPLEC.WK4 really comes from in TELIO.WK3. Sheet J, column B of TELIO.WK3 contains a "Price of Materials" that appears to be the source. But the values do not match the values reported in TFPLEC.WK4. Sheet I of

TELIO.WK3 also contains a "Price of Materials" in cells C198-C207 that is close, but does not match the 1984-1993 growth rates for the index reported in TFPLEC.WK4. Also, there is no 1994 value reported. Thus, the precise source of the index values is obscure.

The errors in the measurement of Materials input in the AT&T-sponsored model result in a 0.4 percentage point per year understatement of both productivity growth and input price growth for the 1988-1994 period, and a 0.9 percentage point per year understatement of both productivity growth and input price growth for the most recent five-year period, 1989-1994.

The AT&T Quantity Index of Capital is Based on Incompletely Documented Methods and Data Sources, and to the Extent that One Can Infer the Methods and Sources from the Spreadsheet, it Contains Errors

In the revised AT&T model, the quantity of capital input is based on perpetual inventory estimates of capital stock and estimates of rental prices. However, given the lack of documentation of data sources and methods, the AT&T-sponsored capital input calculations remain a "black box" and cannot be thoroughly evaluated.

The AT&T-sponsored capital input index is reported in the AT&T spreadsheet TFPLEC.WK4, cells AS23-AS33 (and in cells AT23-AT33, and EA23-EA33), with the computations found in the AT&T spreadsheet KAPAGG.WK3. The AT&T-sponsored estimates of capital stocks are based on a number of critical data elements: current dollar investment (KAPAGG.WK3,

C7-M12), the price indexes of investment (KAPAGG.WK3, C16-M21), the starting values or benchmarks (KAPAGG.WK3, W7-W12), and the depreciation rates (KAPAGG.WK3, Q26-Q31). No documentation is provided regarding the sources used to derive these elements. In reviewing the model, we found that the benchmark utilized by AT&T's consultant is, in part, developed from Book to Economic Value Adjustment factors (KAPAGG.WK3, R35-R40) that we calculated in our original TFP study. Clearly, these factors have been incorrectly applied in the AT&T-sponsored model. The factors we calculated in our original study were for 1984; the AT&T model applies them to 1988. AT&T does not provide a reason for presuming that our 1984 calculated ratios would be valid for calculations using 1988 data. The service price computations (KAPAGG.WK3, D50-M55) are considerably more complex than the capital stock calculations, but no documentation is provided regarding the service prices. In KAPAGG.WK3, a TSP program is referred to as the source of the service price computations. However, this program was not provided as part of the documentation for the AT&T-sponsored model. This is an example of AT&T-sponsored results that cannot be reproduced or validated.

The errors in measurement of Capital input in the AT&T-sponsored model result in a 0.3 percentage point per year understatement in both productivity growth and input price growth for the 1988-1994 period, and a 0.2 percentage point per year understatement of both productivity growth and input price growth for the most recent five-year period, 1989-1994.

The AT&T Model Employs Data Extrapolations Unnecessarily and Inconsistently

The AT&T model often employs extrapolations for no apparent reason when actual data are available. Moreover, the extrapolations do not seem to be based on any consistent approach (e.g., using different time periods for the basis of extrapolation for various series) and no justification or explanation is given why one time period is used as the basis of extrapolation versus another time period.

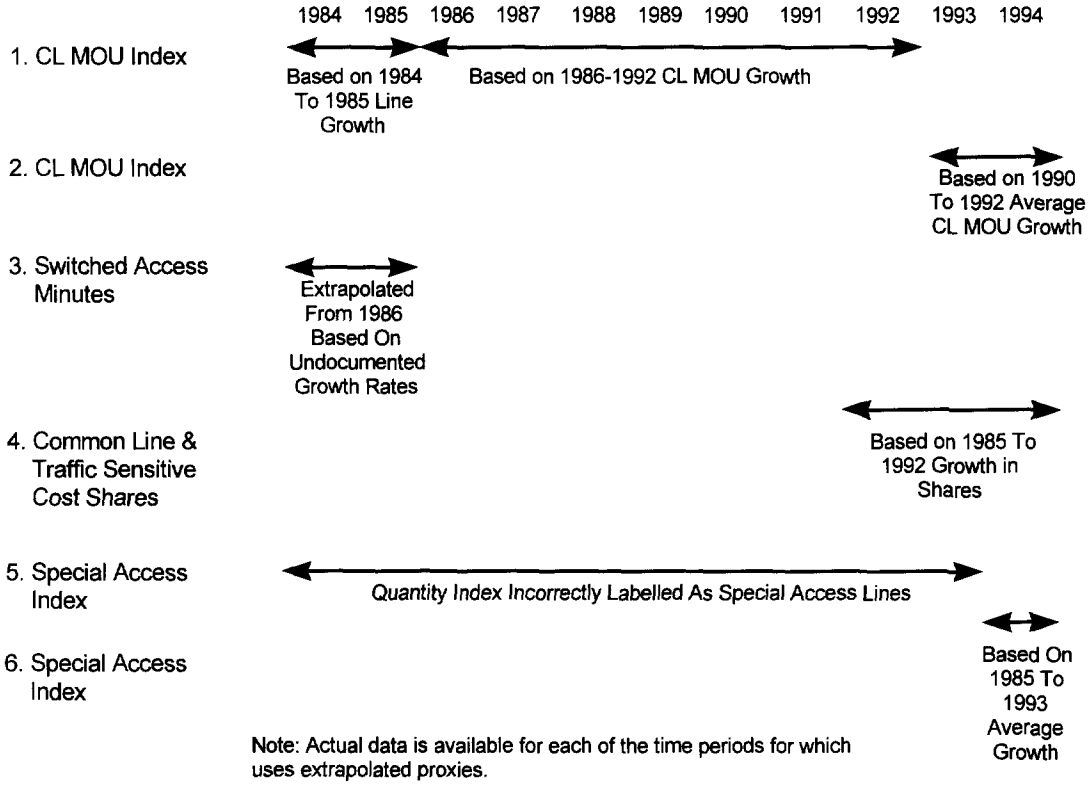
While we have not completely documented all instances, below are cases of extrapolations (and further instances of incorrect documentation) found in the AT&T spreadsheet YAGG.WK4. An illustration of these unnecessary and inconsistent extrapolations is found in Exhibit 3.

1. "CL MOU" index (G139) begins with 1984-1985 total access line growth (I116-I117), while the rest of the "CL MOU" index is assembled with minutes of use growth obtained from DC140-DC149.
2. 1993 and 1994 "CL MOU" (G148-G149, referenced back to DC148-DC149) was set equal to 1990-1992 average growth from cell DA152, which is labeled as 1985-1992 average growth, at a time when CL MOU growth has been slowing.
3. 1984 and 1985 "Switched Access Minutes" (L116-L117/H139-H140) is estimated with undocumented growth rates applied to 1986 switched access minutes (L118).

4. 1993 and 1994 Common Line (L148-L149/CU148-CU149) and Traffic Sensitive (M148-M149/CV148-CV149) shares are estimated by 1985-1992 growth in shares.
5. Special Access index (I139-I149) incorrectly identified as "Special Access Lines." In fact, this quantity index is not estimated by the number of Special Access Lines. The 1984-1993 values are from the original Christensen LEC TFP model, which obtained Special Access quantity by dividing special access revenues by the Special Access price index.
6. The 1994 AT&T "Special Access Lines" index is an extrapolated value, estimated by 1985-1993 average growth in the Christensen Special Access quantity index (K128). No explanation is given why an extrapolated value is used instead of an actual value, or why the extrapolation is based on the 1985-1993 period, instead of one of the other periods used in the AT&T-sponsored model as a basis for extrapolation.

Exhibit 3

AT&T's Arbitrary Data Extrapolations



Note: Actual data is available for each of the time periods for which uses extrapolated proxies.

Summary

Dr. Norsworthy's claims that his model is accurate, valid, fully documented, and reproducible are false. The AT&T Performance-Based model contains numerous errors, is missing documentation, and has incorrect documentation. Most importantly, however, Dr. Norsworthy's work is plagued with several serious methodological errors that cause the AT&T model to overstate substantially LEC productivity growth. Table 1 demonstrates the magnitude of those errors.

Table 1 summarizes the errors in the AT&T Performance-Based Model's computation of productivity growth. A comparison of the AT&T Interstate-Only and Total Company productivity growth results indicates the magnitude of the error due to the assumption that interstate-only productivity growth can be meaningfully measured. This error results in an average overstatement in productivity growth of 1.6 percentage points per year over the 1988-1994 period and 1.2 percentage points per year over the most recent five-year period, 1989-1994. In addition to the other errors described above, Table 1 also indicates an adjustment for Labor input of 0.2 percentage points per year for the 1988-1994 period and 0.3 percentage points per year for the 1989-1994 period. This is because the AT&T-sponsored model measures Labor quantity as the number of end-of-year employees, instead of an average over the year as in the USTA TFPRP model. The AT&T-sponsored model also makes an adjustment in Labor quantity for part-time employees. Finally, the AT&T-sponsored model provides estimates for the seven RBOCs only. Table 1 indicates that adding GTE,

Southern New England, Sprint and Aliant data results in a 0.1 percentage point decline per year for the 1988-1994 period and no change for the 1989-1994 period.

When the AT&T Interstate-Only results are adjusted to correct for all of these errors, productivity growth averages 2.9% over the 1988-1994 period, and 3.1% over the 1989-1994 period. These results are the same as our USTA TFPRP results for the 1988-1994 period and the most recent five-year period, 1989-1994.

Table 2 summarizes the errors in the AT&T Performance-Based Model's computation of input price growth. When the AT&T results are adjusted for the errors described above, LEC input price growth averages 2.9% over the 1988-1994 period, and 4.1% over the most recent five-year period, 1989-1994. These results are the same as our USTA TFPRP results.

In summary, our analysis demonstrates that once the errors in the AT&T-sponsored model are corrected, the AT&T-sponsored results validate the USTA/Christensen results.

Table 1
Methodological Errors in the AT&T Performance-Based Model and Their Impact on Measured Productivity Growth

1988-1994, 1989-1994 Averages

AT&T Model Results	1988-1994	1989-1994
AT&T Interstate-Only LEC Productivity Growth	6.0%	5.3%
AT&T Total Company LEC Productivity Growth	4.4%	4.1%
Errors in AT&T Model		
Assumption that interstate-only productivity can be computed	1.6%	1.2%
Assumption that Total Cost must equal Total Revenue	0.4%	0.4%
Omission of Miscellaneous Services from Total Output	0.4%	0.5%
Incorrect measurement of Local and Toll Output	0.9%	0.9%
Incorrect measurement of Interstate Access Output	0.6%	0.5%
Effect of incorrect assignment of Total Cost to Labor, Capital and Materials	-0.2%	-0.3%
Incorrect measurement of Capital Input	-0.3%	-0.2%
Incorrect measurement of Materials Input	-0.4%	-0.9%
Labor Input adjustment	0.2%	0.3%
Measurement of RBOC-only performance	-0.1%	0.0%
Total of Errors in AT&T Model**	**3.1%**	**2.2%**
LEC Productivity Growth for AT&T Performance-Based Model After Correcting for Errors	**2.9%**	**3.1%**

**Figures may not add due to rounding.

Table 2
Methodological Errors in the AT&T Performance-Based Model and Their Impact on Measured Input Price Growth
1988-1994, 1989-1994 Averages

AT&T Model Results	1988-1994	1989-1994
AT&T-measured LEC Input Price Growth	1.0%	1.1%
Errors in AT&T Model		
Assumption that Total Cost must equal Total Revenue	-1.3%	-1.8%
Effect of incorrect assignment of Total Cost to Labor, Capital and Materials	-0.2%	-0.3%
Incorrect measurement of Labor Input	0.2%	0.3%
Incorrect measurement of Materials Input	-0.4%	-0.9%
Incorrect measurement of Capital Input	-0.3%	-0.2%
Measurement of RBOC-only performance	-0.1%	-0.1%
Total of Errors in AT&T Model**	**-2.0%**	**-3.0%**
LEC Input Price Growth for AT&T Performance-Based Model After Correcting for Errors	**2.9%**	**4.1%**

**Figures may not add due to rounding.

Appendix 1
Mathematical Demonstration that the AT&T Methodology Simply Extrapolates the X Factor from Historical Output Price Growth

The AT&T Methodology is based on two assumptions that, together, simply tie the X factor to historical output price growth. The first assumption is that the X factor should be based on historical input price growth and historical TFP growth. The second assumption is that Total Cost is equal to Total Revenue.

By definition, Total Cost is equal to the price of total input times the quantity of total input:

$$C = W \cdot V \qquad (1)$$

where C is Total Cost, W is the price of total input, and V is the quantity of total input.

Also by definition, Total Revenue is equal to the price of total output times the quantity of total output.

$$R = P \cdot Y \qquad (2)$$

where R is Total Revenue, P is the price of total output, and Y is the quantity of total output.

The AT&T assumption that Total Revenue equals Total Cost in every period yields the following result:

$$P \cdot Y = W \cdot V \qquad (3)$$

Equation (3) implies that the growth in the price of total output plus the growth in the quantity of total output equals the growth in the price of total input plus the growth in the quantity of total input, or:

$$p + y = w +$$ (4)

where lower case letters represent the percentage change in the upper case letters.

Moving y to the right hand size of the equation, one obtains:

$$p = w - (y - v) = w - tf$$ (5)

Based on the AT&T assumption that the X factor should be based on historical input price growth and TFP growth, one obtains:

$$X = tfp - w$$ (6)

Combining (5) and (6), it can be seen that the AT&T assumptions result in a self-perpetuating X factor that is based on historical output price growth:

$$p = w - (y - v) = w - tfp = -$$ (7)

or,

$$p = -X$$ (7a)

For example, if historical output prices declined by 3% annually (e.g., p = -3), the AT&T model would produce an X factor that would decrease relative to the GDPPI at the same rate of 3% per year (e.g., -X = 3). Therefore, AT&T's approach to measuring productivity by assuming Total Revenue must equal Total Cost in every period, and its inclusion of both productivity growth and input price growth in the X factor, results in the X factor being based entirely on historical trends in output price growth.

ATTACHMENT 7

USTA EX PARTE
CC DOCKET NO. 94-1
RESPONSE TO MCI PRODUCTIVITY ANALYSIS

USTA COMMENTS
CC DOCKET NO. 96-262
JANUARY 29, 1997

MCI's X-Factor Computations Are Both Flawed ROR Regulation Constructs and Computationally Defective

USTA has already discredited MCI's X-Factor computations and approach.

In the price cap review proceeding, MCI purported to compute X-Factors based on the accounting earnings results of the price cap LECs. USTA has already presented evidence that completely discredits the MCI approach, which was subsequently relied upon in ex parte presentations by the group of parties calling themselves CARE. USTA's evidence that proves MCI's approach is flawed and MCI's computations are defective is attached.

MCI's approach is flawed ROR regulation.

The intent of the so-called "analysis" performed by MCI was to determine how large an X-Factor it would take to force the accounting earnings of the price cap LECs to drop to 11.25% in a single year. MCI did not even attempt to measure LEC productivity. Instead, MCI selects an increase in the X-Factor sufficiently high so as to wipe out entirely any amount of financial incentives for increased efficiencies present in the LEC price cap plan since its inception. MCI's method is not price cap regulation in any form. MCI's approach, beyond rehabilitation, cannot meet the Commission's criteria for an economically sound approach.

The effects of 10% X-Factor are profound.

As demonstrated in the attached USTA ex parte, the effects of 10% X-Factor are profound. Even absent the effects of competition and the implementation of the 1996 Act, a 10% X-Factor, by itself, would completely eliminate any profitability of the price cap LECs in five years. In order to counteract such a dire regulatory restriction, LECs would have to experience minutes of use growth of 18% per year or more.[1] Such will never be the case. MCI's approach is ludicrous.

MCI's price cap decision analysis is computationally dishonest.

MCI and CARE, relying on MCI's computations, present "analysis" of the decisions made by the price cap LECs that is computationally dishonest. MCI presents tables that purport to show that the price cap LECs would not have chosen the 5.3% X-Factor / no sharing option unless their productivity was at least 8.54% and in another case at least 10.86%. USTA has shown MCI to be seriously wrong. Examination of MCI's computations reveals that MCI assumes that each price cap LEC was earning 11.25% in the year prior to its annual filing, when electing among the available price cap options. Such was clearly not the case. USTA shows that even MCI's flawed ROR regulation construct yields much lower X-Factor estimates of 2.85% and 3.47%, respectively, once MCI's obvious computational errors are corrected. However, fundamentally, MCI's ROR regulation construct remains flawed.

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[1] This computation assumes: fully half of the LECs' interstate demand is minutes related; 2.5% inflation per year; 3% access lines growth; and 0% growth in the purchases of inputs by LECs. Obviously, if lines growth is slower or negative (due to competition), the hurdle represented by a 10% X-Factor is even steeper, and the required annual growth minutes-related demand would exceed 20%, an even more preposterous condition.

May 28, 1996

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M Street, NW - Room 222
Washington, DC 20554

Ex Parte
CC Docket 94-1
4th FNPRM

Dear Mr. Caton,

On May 28, 1996, Whit Jordan, Jeff Olson, Jeff Pursley and Frank McKennedy, representing the United States Telephone Association (USTA), met with Greg Rosston, Acting Chief Economist of the Common Carrier Bureau and Anthony Bush of the Competitive Pricing Division, of the Common Carrier Bureau.

The purpose of the meeting was to review generally USTA's position in the Price Cap Fourth Further Notice of Proposed Rulemaking, CC Docket No. 94-1 and to set out the fundamental flaws, errors and misstatements made by MCI, CARE and Ad Hoc regarding selection of a LEC productivity factor.

Enclosed are an original and two copies of this letter and an attached document left with the staff. Please include them in the public record of this proceeding.

Respectfully submitted,

Frank McKennedy
Director-Legal & Regulatory
Affairs

attachment

cc: Gregory Rosston
Anthony Bush

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What Is Expected from Price Cap Regulation

- Price cap regulation is designed to provide incentives for companies to become more productive through the promise of increased profits.

- Both the original and interim Price Cap plans anticipated that LEC earnings would be greater than 12.25%.

- LEC earnings, after five years of Price Caps, should be greater than 11.25%.

The Effect of the Productivity Components

- The existing productivity components (X-Factor and "g/2") resulted in a $600M reduction in the LEC PCIs.

- This is determined from the average 5.05% X-Factor and the average 1.51% "g/2" applicable to Carrier Common Line -- resulting in a 2.8% reduction in price cap indexes.

    - This is a 5.3% reduction in real terms.

- The productivity components in the current price cap plan are not too low.

- CARE incorrectly links its proposed productivity offset to a perceived accounting earnings "problem" -- based on what it feels a LEC should earn.

Productivity Offset and "g/2" Effects in 1996 Annual Filing

	Common Line	Traffic Sensitive	Trunking	TOTAL
"R" Value	$10,362,451,569	$4,320,332,719	$6,779,586,785	$21,462,371,073
GDP-PI	2.4960%	2.4960%	2.4960%	N/A
X-Factor	5.05%	5.05%	5.05%	N/A
"g/2" Value	1.51%	N/A	N/A	N/A
$ Impact	($314,225,834)	($110,341,298)	($173,150,646)	**(597,717,778)**
% Impact	-3.0%	-2.6%	-2.6%	**-2.8%**

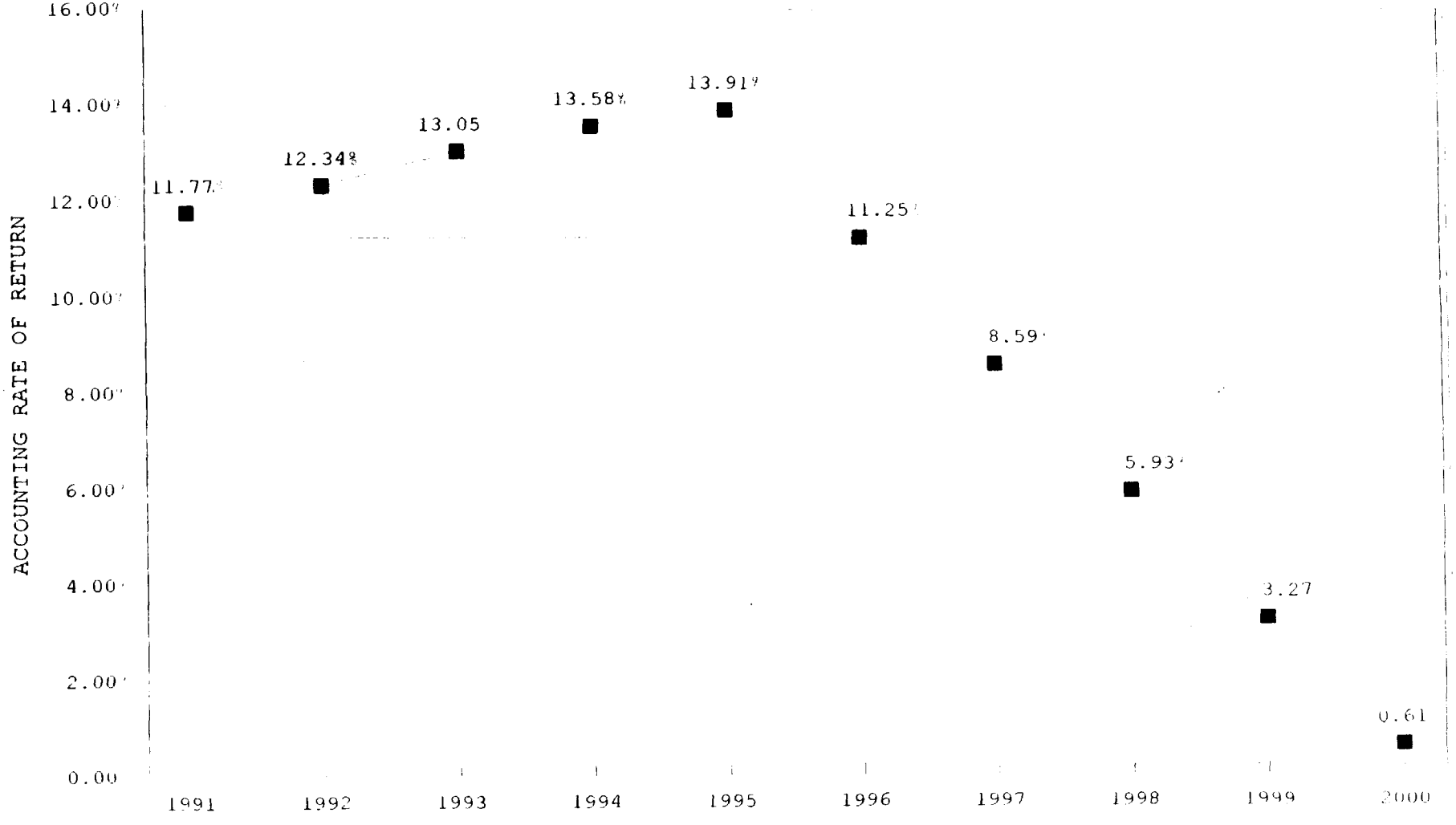
Any Perceived "Problem" with Accounting Earnings Are an Ill Conceived Level Issue, Not an "X-Factor" Issue

- MCI, CARE and Ad Hoc attempt to recapture five years of accounting earnings growth in a single year, using the long-term X-Factor as the vehicle.

- The earnings analyses of MCI, CARE and Ad Hoc are not credible or fundamentally sound studies of LEC productivity. This incorrectly results in their estimates of 8.8% to 10.3% for X-Factor.

- Those studies that advocate higher X-Factors are thinly veiled attempts to drive LEC prices and accounting earnings below reasonable levels.

ACCOUNTING EARNINGS EFFECT OF CARE'S 10% X-FACTOR METHOD



Why Most LECs Did Not Choose the 12.75% ROR Regulation Option

- The current LEC price cap options are not productivity choices but rather sharing choices.

- The choice has been between ROR regulation at 12.75% (the 4.0% X-Factor option) and price caps with no sharing (the 5.3% X-Factor option).

    - The "middle" option (4.7% X-Factor) was never in play.

- This is due to fact that:

    - For no LEC was the price cap option selection (in either the 1995 or the 1996 Annual Filing) a true "test" of productivity.

    - Selections were affected by factors completely unrelated to productivity, including: the extent to which study areas were priced below caps; and changes to sharing mechanics (the "add-back" additive); influences from the investment community.

    - Some LECs were able to select the no-sharing option only with the assurance that a lower X-Factor would be subsequently available as accounting earnings were driven lower in the future.